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# U.S. Senator Ron Wyden

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## **Wyden Chairs First Senate Nanotechnology Hearing** **"Small Science" could change the way Americans live, work, treat disease**

**Washington, DC** – U.S. Senator Ron Wyden (D-Ore.) today convened the first Senate hearing on nanotechnology, which involves the development of devices and processes on the molecular scale. Nanotechnology is widely considered to hold enormous scientific and economic promise for the future, from technology to manufacturing to agriculture to health care. Testifying at the hearing before the Subcommittee on Science, Technology and Space were Richard Russell of the Office of Science and Technology Policy; Mark Modzelewski, Executive Director of the NanoBusiness Alliance; Dr. Samuel I. Stupp, Director of the Institute for Bioengineering and Nanoscience in Advanced Medicine at Northwestern University; Dr. Stan Williams, Director of Quantum Science Research at Hewlett-Packard; and Dr. Nathan Swami, Director of the Initiative for Nanotechnology of the Commonwealth of Virginia, and Microelectronics Program Director at the University of Virginia. Wyden, who chairs the Subcommittee, began the hearing with brief opening remarks:

### **Senator Wyden's Prepared Remarks**

"Today the Subcommittee on Science, Technology and Space convenes the first-ever Senate hearing on nanotechnology. In coffee shops and senior centers this afternoon, Americans aren't exactly buzzing about this science of building electronic circuits and devices from single atoms and molecules. But there's no question that this field will dramatically change the way Americans live.

"My own judgment is the nanotechnology revolution has the potential to change America on a scale equal to, if not greater than, the computer revolution. As Chair of this Subcommittee, I am determined that the United States will not miss, but will mine the opportunities of nanotechnology. At present, efforts in the nanotechnology field are strewn across a half-dozen Federal agencies. I want America to marshal its various nanotechnology efforts into one driving force to remain the world's leader in this burgeoning field. And I believe Federal support is essential to achieving that goal.

"Legislation I am introducing today will provide a smart, accelerated, and organized approach to nanotechnology research, development, and education. In my view, there are three major steps America must take to ensure the highest success for its nanotechnology efforts.

“First, a National Nanotechnology Research Program should be established to superintend long-term fundamental nanoscience and engineering research. The program’s goals will be to ensure America’s leadership and economic competitiveness in nanotechnology, and to make sure ethical and social concerns are taken into account alongside the development of this discipline.

“Second, the Federal government should support nanoscience through a program of research grants, and also through the establishment of nanotechnology research centers. These centers would serve as key components of a national research infrastructure, bringing together experts from the various disciplines that must intersect for nanoscale projects to succeed. As these research efforts take shape, educational opportunities will be the key to their long-term success.

“In this hearing room, I have already laid out a challenge to triple the number of people graduating with math, science and technology degrees. Today, I commit to helping students who would enter the field of nanotechnology. This discipline requires multiple areas of expertise. Students with the drive and the talent to tackle physics, chemistry, and the material sciences simultaneously deserve all the support we can offer.

“Third, the government should create connections across its agencies to aid in the meshing of various nanotechnology efforts. These could include a national steering office, and a Presidential Nanotechnology Advisory Committee, modeled on the President’s Information Technology Advisory Committee.

“I also believe that as these organizational support structures are put into place, rigorous evaluation must take place to ensure the maximum efficiency of our efforts. Personally, I would call for an annual review of America’s nanotechnology efforts from the Presidential Advisory Committee, and a periodic review from the National Academy of Sciences. In addition to monitoring our own progress, the U.S. should keep abreast of the world’s nanotechnology efforts through a series of benchmarking studies.

“If the Federal government fails to get behind nanotechnology now with organized, goal-oriented support, this nation runs the risk of falling behind others in the world who recognize the potential of this discipline. Nanotechnology is already making pants more stain-resistant, making windows self-washing and making car parts stronger with tiny particles of clay. What America risks missing is the next generation of nanotechnology. In the next wave, nanoparticles and nanodevices will become the building blocks of our health care, agriculture, manufacturing, environmental cleanup, and even national security.

“America risks missing a revolution in electronics, where a device the size of a sugar cube could hold all of the information in the Library of Congress. Today’s silicon-based technologies can only shrink so small. Eventually, nanotechnologies will grow devices from the molecular level up. Small though they may be, their capabilities and their impact will be enormous. Spacecraft could be the size of mere molecules.

“America risks missing a revolution in health care. In my home state, Oregon State University researchers are working on the microscale to create lapel-pin-sized biosensors that use the color-changing cells of the Siamese fighting fish to provide instant visual warnings when a biotoxin is present. An antimicrobial dressing for battlefield wounds is already available today, containing silver nanocrystals that prevent infection and reduce inflammation. The health care possibilities for nanotechnology are limitless. Eventually, nanoscale particles will travel through human bodies to detect and cure disease. Chemotherapy could attack individual cancer cells and leave healthy cells intact. Tiny bulldozers could unclog blocked arteries. Human disease will be fought cell by cell, molecule by molecule – and nanotechnology will provide victories over disease that we can’t even conceive today.

America risks missing a host of beneficial breakthroughs. American scientists could be the first to create nanomaterials for manufacturing and design that are stronger, lighter, harder, self-repairing, and safer. Nanoscale devices could scrub automobile pollution out of the air as it is produced. Nanoparticles could cover armor to make American soldiers almost invisible to enemies and even tend their wounds. Nanotechnology could grow steel stronger than what’s made today, with little or no waste to pollute the environment.

Moreover – and this is key – America risks missing an economic revolution based on nanotechnology. With much of nanotechnology existing in a research milieu, venture capitalists are already investing \$1 billion in American nanotech interests this year alone. It’s estimated that nanotechnology will become a trillion-dollar industry over the next ten years. As nanotechnology grows, the ranks of skilled workers needed to discover and apply its capabilities must grow too. In the nanotechnology revolution, areas of high unemployment could become magnets for domestic production, engineering and research for nanotechnology applications – but only if government doesn’t miss the boat.

Our country’s National Nanotechnology Initiative is a step in the right direction. This nation has already committed substantial funds to nanotechnology research and development in the coming years. But funding is not enough. There must be careful planning to make sure that money is used for sound science over the long-term. That is the reason for the legislation I am issuing today. The strategic planning it prescribes will ensure that scientists get the support they need to realize nanotechnology’s greatest potential.

In 1944 the visionary President Franklin Delano Roosevelt requested a leading American scientist’s opinion on advancing the United States’ scientific efforts to benefit the world. Dr. Vannevar Bush offered his reply to President Harry S Truman the next year, following FDR’s death. In his report to the President, Dr. Bush wrote, “The Government should accept new responsibilities for promoting the flow of new scientific knowledge and the development of scientific talent in our youth. These responsibilities are the proper concern of the Government, for they vitally affect our health, our jobs, and our national security. It is in keeping also with basic United States policy that the Government should foster the opening of new frontiers and this is the modern way to do it.”

“Those principles, so true nearly sixty years ago, are truer still today. I propose that the government now accept new responsibilities in promoting and developing nanotechnology. Our witnesses today will make it clear that nanotechnology will vitally affect our health, our jobs, and our national security – as well as our economy. I look forward to hearing from them on how this Congress might take up what I believe is a proper concern – and an essential one – indeed.”

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*witness testimony from today's hearing is available online at*  
<http://commerce.senate.gov/hearings/hearings0202.htm>